Emission Forecasting Overview

Introduction

- Computerized emission forecasting at CARB since 1981

- Used to predict future emission levels based on expectations of future economic conditions, population growth, and emission controls

- Used to develop baseline emission inventory projections for SIP and local AQMP's

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Introduction (continued)

- Also used to backcast emissions (for historical years) to account for improved inventory methodologies
- Air basin and county level emission trends calculated for period 1975-2010

Socioeconomic and Demographic Growth Activity

Growth Factors

● What are growth factors?

   – Derived from county-specific economic activity profiles, population forecasts, and other socio/demographic activity

Growth Factors (Continued)

- Sources of data
    - District supplied data based on information from COGs
    - Economic activity studies contracted by ARB (e.g. DRI/McGraw-Hill, CSU Fullerton)
    - Demographic data (e.g. population estimates-DOF, VMT-Caltrans)

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Growth Factors (Continued)

- How are growth factors linked to emissions?
  - **"Rule of Thumb"**: Growth profiles are typically associated with the type of <u>industry</u> and secondarily to the type of <u>emission process</u>.
    - **Point Sources**: Economic output profiles by industrial sector are linked to emission sources via SIC.

Growth Factors (Continued)

- **Area-wide and Aggregated Point Sources**: Other growth surrogates such as population, dwelling-units, fuel usage etc. may be used

    Example: Emissions from residential fuel combustion are generally linked to # of dwelling-units as a growth parameter

Control Factors

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Control Factors

● What are control factors?

– Control factors are derived from adopted ARB regulations or district rules which impose emission reductions or a technological change on a particular emission process

– In general, control factors incorporate three components:

  • Control Efficiency
  • Rule Penetration
  • Rule Effectiveness

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Control Factors (Continued)

- Sources of data
  - ARB Regulations:

    Control profiles are derived from adopted state regulations by ARB staff (e.g. consumer products, clean fuels, etc.)

  - District Rules:

    Control profiles are developed by district staff based on adopted district rules (e.g. IC engine rules)

  - Other regulatory agencies: DPR, U.S. EPA, etc.

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Control Factors (Continued)

- How are control factors linked to emissions?

    - **"Rule of Thumb"**: Control data are closely linked to the type of <u>emission process</u> and secondarily to the type of <u>industry</u>

    - Control data are assigned to emission categories which are targeted by the rules

        (Formerly, control data were maintained by broad control category definitions. In the future controls will be rule-source specific.)

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General Forecasting Equation

$E_{fy}(s,p) = E_{by}(s,p) * TF * GF * [CF(m_1,s,p) * CF(m_2,s,p) *...* CF(m_j,s,p)]$

where:

E_{fy} = Emissions in the future year

E_{by} = Emissions in the base year

    where:

    E_{by} = Process Rate * Emission Factor

TF = Temporal Factor

GF = Growth Factor (Growth Level FY / Growth Level BY)

CF = Control Factor (Control Level FY / Control Level BY)

s = The source category (SCC/SIC or EIC)

p = The pollutant

m = The control measure impacting the source category

j = The number of measures impacting the source category, s

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On-Road Mobile Source Forecasts
(EMFAC2000 Model)

Off-Road Mobile Source Forecasts (OFFROAD Model)